

## **SITUATED DESIGN THINKING: EXPERIENTIALLY BASED DESIGN APPROACHES**

B. Tan

Department of Industrial Design Temasek Polytechnic, Centre for Design Innovation,  
Temasek School, Singapore

**Abstract:** We do not design things in a vacuum, but rather, it is done in a dynamic relationship with people, their environment, cultural, sociological and ideological dispositions (Fulton-Suri, 2002). There are vast areas of human experiences that have barely begun to be explored, in particular those that are related to people's emotional responses to objects in the context of industrial design in Singapore. The literature review will show that there is little explicit knowledge to understand people's experiences and emotional responses that would be helpful to designers in making predictions about designing products, although there are some useful frameworks available to help us think about these issues. This study was conducted to investigate how the knowledge of the experiential properties of users can be effective in the area of product design. It is divided into two parts with the first being the literature review on experiential design approaches and sensorial elements in product design, and the second being the application of the findings to the design of a product. This study looks at user experiences with products in a holistic, experiential base approach, linking these experiential characteristics which are subjective, and relating them against the formal objective qualities of a designed object, to better understand the intangible perceived values that people afford to products. The outcomes of the study indicated that subjective experiential descriptors can be related to specific formal qualities of a product, creating specific product experiences. This will assist product designers to create lasting, memorable product experiences.

**Keywords:** *situated, emotive, experiential*

### **1. Introduction**

There is a wealth of information on the area of design methodology and processes structures, functionality and usability approaches but very limited when it comes to experiential approaches in product design.

The study looks at user experiences with products in a holistic, experiential base approach, linking these subjective experiential characteristics with and relating them to the formal qualities of a designed object, to better understand the specific intangible perceived values that people afford to products and vice-versa.

## **2. Experimental based design approaches (EBD)**

“Consumers today don’t just buy a product; they buy value in the form of entertainment, experience and self identity. A cognitive interplay of our senses and our environment that would create pleasurable and lasting experiences” (Sweet, 1999).

Examples of published reports in this area of EBD approaches includes product personalities (Jordan, 1997, 2002) product playfulness (Lieberman, 1977; Webster and Martocchio, 1992, Noyes and Littledale, 2002), product luxury experiences (Kuethe and Reinmoeller, 1999, Nonaka and Reinmoeller, 2000), emotional experiential needs (Harada, 1997; Lee, 1999, Nagamachi, 1999), product pleasure (Tiger, 1992; Green and Jordan, 1999; Jordan, 1998b, 1999, 2000) and emotional benefits (Desmet, Tax and Overbeeke, 2000).

## **3. Formal qualities of a design project as it relates to experiential concepts of this study**

The term ‘designed object’ is defined as a product that is the outcome of a design process (Vihma 1995). Formal product qualities referred to here are those that can be objectively measured or that have a clear and fairly unambiguous definition within the context of design. Green and Jordan (2000) describe six categories that make up the elements of a product’s formal qualities. They are the product’s color, form, graphics, materials, sound and interaction design. According to Green & Jordan, these six elements make up a product’s formal qualities and are the building blocks from which the overall design of an object is created.

How the six elements interrelate can be illustrated when we take the example of a digital hi-fi stereo system that is available in the market today. The product’s sound qualities in term of its music fidelity as well as the sound the CD cover makes when the eject button is depressed equates to the user’s perception of perceived product quality. If the section that our fingers touch are made of cheap plastic i.e. material, then the perceive quality is low. There is a trend towards an increase use of metals in electronic goods (Kamrani, 2000). The use of fabric on the speaker housing, the form of the main stereo casing and the various optional colors they come in, right down to the interface with not just the hardware but the software of the digital are factors that contribute to the overall desirability of the product. Vihma (1995) also describes the elements that constitute the formal qualities of a designed product that encompasses Jordan’s six elements of color, form, graphics, materials, sound and interaction design. She uses Bense (1971) semiotic model to analyze designed products that breaks down into four main categories of the hyletic or material dimension, the syntactic or technical, graphic and sound specification dimension, the pragmatic or functional, usability, interface dimension and the semantic dimension which includes morphetics or the product’s form and color. These formal product properties as described by both Green et.al (2000) and Vihma (1995), when used with the frameworks of Tiger (1992) and Jordan (1999) underscores a relationship between the product’s formal qualities and the four experiential concepts of users.

## **4. Research question**

A difficulty with affective concepts in the realm of experiential and emotional context is that they are probably as intangible as they are appealing. The concepts of hedonic, experiential, sensorial, and

emotional issues are somewhat undifferentiated. They are referred to as collective nouns for all types of affective phenomena. Design literature reviews tend to refer to these when studying anything that is so-called intangible, non-functional, non-rational or non-cognitive. Given the subjective, qualitative nature of experiential issues, my research question would be as follows;

- Do the subjective experiential concepts of the Physiological, Sociological, Cultural and Ideological experiences of users influence specific objective formal properties of a product?

## **5. The four experiential concepts**

Fulton Suri (2000) describes a dynamic relationship between the design of products and people that takes into consideration, the context of the environment, sociological, cultural and ideological dispositions of users.

### **5.1 Physiological experience (Pe)**

This category of experiences is dealing with the physical aspects of product use. Ergonomics and anthropometrics would come under this heading. This category of experiences is related to the body and its interaction with physical elements in the environment, derived from the body's sensory organs such as touch, smell, taste and feelings of pleasure (Tiger, 1992). For example, in a potentially dangerous environment like a chemical plant, protective clothing such as hard hats, steel cap shoes and gas masks can be physiological need products. These products must not be clumsy or uncomfortable otherwise they become dangerous and ineffective. They therefore must provide a positive physiological experience otherwise people will avoid wearing them. Another example of this category experience is those hand held devices that people hold and use. They could include PDAs, pens, toothbrushes, calculators, computer keyboards, shavers, remote controllers, door handles, body massage equipment and many more. The presence of many products on the market that makes use of silicon rubber finishes are catering to this category of sensual physiological tactile experience of touch. In cases where the products come into direct contact with the body, such as a shaver or personal body massagers, the product must feel nice against the skin of the user, which will add to the positive quotient of the physiological experience with the product.

### **5.2 Sociological Experiences (Se)**

This category of experiences refers to the relational aspects of product to people, people to people as well as individual to society relationship pleasure models (Taylor, Roberts and Hall, 1999). This category brings together the context of how products may facilitate social interaction by being status symbols. For example, the associative status of owning a Rolex watch or driving a Mercedes-Benz coupe. The relationship between the user and the product in these examples exemplifies social identity. Clothes are another. It is not just clothes that send out social signals but products such as furniture are often loaded with social significance. In a typical Singaporean office setting, the size of a person's desk gives an indication of the person's status and position in the company (Low and Tan, 1996). Even the materials used in an object like the office chair can have a bearing on the person's office status. Leather in this situation is higher status than fabric, as well as the height of the backrest. The typist chair has a low backrest whilst the managing director backrest goes way past his head when seated. In many other instances, products have the negative effect of being a social nuisance. For example, products that makes a lot of noise in a social environment. One such product is the ringing tone of hand phones in movie theatres as well as during a seminar or talk. Others could be the noise of petrol driven lawn mowers or a pneumatic jack hammer on the street worksite.

### 5.3 Cultural Experience (Ce)

Culture deals with the ideas, beliefs and customs that are shared and accepted by people in a society (Hofstede, 1991). Culture, by definition, is about transmitting values and traditions from one generation or member to the next and seen as a factor that is dynamic rather than a static set of values, norms and practices. Emotional responses to products can be linked to product aesthetics and that it is dependent, in part on people's cultural values and in part, on their natural human instincts Hatch (1997). In the case of colors, for example, the color red is usually associated with danger (Nemcsics, 1993). This may explain its usage in products that are associated with safety equipments and services like fire-engines, fire hydrants, warning lights etc. Tough and tender cultures. Tough cultures are those cultures where people are likely to be more concerned about performance aspects of the vehicle whilst tender cultures were more likely to choose on the basis of non- performance aspect criteria but more on emotional issues (Mooij, 1998). The form of some of these all terrain 4 WD vehicles as 'tough and muscular' and they look like they have been 'working out in the gym', which would therefore appeal to a tough culture society.

### 5.4 Ideological Experience (Ie)

This area deals with people's values. These includes, for example tastes, moral values and personal aspirations (Tiger, 1992). However, in design, ideologies such as the Bauhaus refers to a set of ideas and attitudes that strongly influence the way people behave and think about design. 'Green', environmentally friendly products might be seen as embodying the value of environmental preservation relating to a good level of ideological experiences with these environmentally responsible products. Ideological issues concerning the environment such as bio-degradable materials and 'green' issues are well documented in Mackenzie (1991), Papanek (1995), Billatos (1997), McConnell (1999) and Edwards (2001). Harley-Davidson motorcycles are enjoying a measure of success because of its past reputation and associations with Hell's Angels in American history of rebelliousness and nomadic lifestyle (Hardy, 1998). In tightly controlled, highly regulated Singapore, people are buying them because it is an outlet for their rebellious nature, vicariously through its associations with the rebellious, notorious Hell's Angel associations. It also says that these people are tired of the mundanity in their lives and riding a bike with a rebellious ideology panders to their own rebellious side of their nature, reinforcing a cooler, less conformist attitude.

## 6. Methodology

An expert, used in the context of this study, is someone whose education, professional training and experience make him or her able to make an informed judgment on issues relative to the product or concept under investigation (Kreuger, 1994). A group of 50 professional Singaporean industrial designers, with more than 4 years working experience, were assembled for the purpose of brainstorming key adjectives that act as descriptors of the various attributes of the 4 experiential concepts (physiological, sociological, cultural and ideological - *Appendix A*). A total of 5 objects (2 luxuries, 2 cheap and 1 designer categories) were also presented to the 50 professional designers (Fig.1). The objects were used as visual elements and were physically available to the professional designers to assist them in the formulating descriptors to the 4 experiential concepts. In discussing these objects, a total of 408 different paired polar descriptor words were discussed or suggested under the various 4 headings. A framework that proposes the experiential concepts of the physiological, sociological, cultural and ideological experience could contribute to an emphatic method to categorize people's affective experience with products. 'Lifestyle boards' consisting of images of selected products were also used to determine the 'known' products from the 'lesser known' ones (Baxter, 1995).



**Figure 1.** The Five Products

However, before commencement of the actual descriptor brainstorm session, participants were asked to give a brief written personal narrative about their own encounters and experiences with the above products. This was done as a warm-up exercise prior to the descriptor brainstorming session proper as well as a way of developing sensitivity to the qualitative aspects of their own encounters and experiences in similar domains (Dittmar, 1992). It also helps the participants to think ‘experientially’, rather than just ‘professionally’ about the objects presented in coming up with adjective descriptors and clustering them relative to the 4 experiential categories.

These adjectives are usually related and derived from aspects of the object’s formal properties as prescribed by Green and Jordan (2000), for example its form, color, sound, graphics, interaction etc.

Snider and Osgood’s (1957) as well as Osgood’s (1967), Semantic Differential Technique and Nagamachi’s (1999), Kansei Semantic Deferential (SD) Evaluation methods were used as a framework to design the questionnaire and a 5-point scale was used to quantify these subjective information for statistical analysis. Snider et. al (1957) and Nagamachi’s (1999) technique were chosen as a scaling technique because it has proven effective in measuring people’s attitude towards a product. It can also elicit the kind of experiential associations people have with the objects, relevant in this study.

In his framework of Kansei Engineering, Nagamachi’s (1999) case studies used semantic differential techniques effectively to relate adjective words to project specific emotions such as ‘speed feeling’ or ‘tight feeling’ in the design of cars, specifically the Mazda MX 5 Miata. Although the experiential terms used in his methods are appropriate, they are too narrowly defined because they are usually only project specific. This study aims to categorize experiential concepts on a much broader platform to cover a range of people’s experiences with a range of different designed products.

Adjective descriptors are used to describe formal properties of the product within the four experiential concepts. Similar methods used in obtaining descriptors can be found in Chapanis (1959) and Pepermans and Corlett (1983), where they discuss the use of psycho-physical methods in ergonomics research in which observers make judgments about the sensations they experience, for example, comfort.

These descriptors that are brainstormed and agreed by the professional designers are then clustered accordingly into the four experiential categories into a questionnaire, administered to a sample group of 50 design students randomly selected from a Singaporean tertiary education institution, representative of the main different ethnic groups in Singapore. This sort of sample focus group methodology is now frequently used for design research purposes because it is an economical means of eliciting a broad range of consumer responses on products. Evidence of this can be found in, for example Krueger (1994), The Glasgow School of Art study for furniture design (Macdonald, 1996), The Royal College of Arts’s users forums (Coleman, 1997), Strickler (1997), and McDonagh-Phillip & Denton (1999).

## 7. Data reduction and statistical analyses

There are 5 design products that will be graded for the 4 experiential categories. Each of the 4 experiential categories consists of 10 descriptors, which were graded on a 5 point semantic differentiate scale, with grade 1 reflecting the least agreement and 5 being the most agreement.

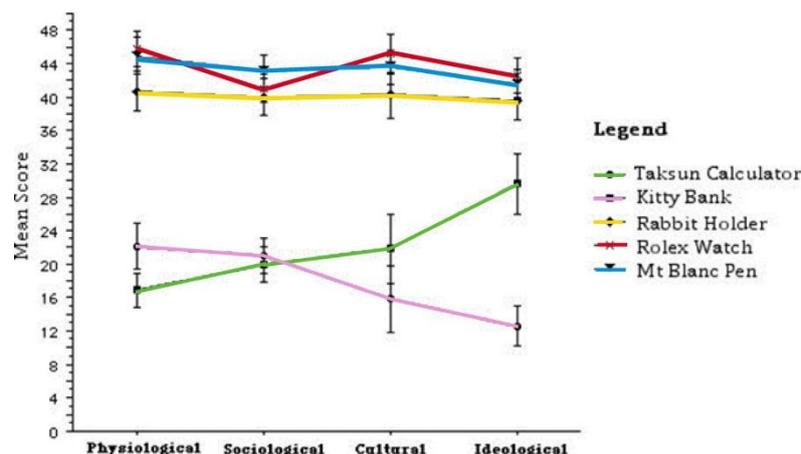
The total score of the 10 descriptors for each experiential concept is recorded for each subject's rating relative to each of the 5 products surveyed.

The ratings of the experiential concepts use discrete ordinal data. However, the total score for all ratings of each experiential category is used for hypothesis testing which is a continuous variable with a normal distribution. Therefore, parametric statistical analyses were used. Associations between the 4 experiential factors were determined by the post-hoc regression analysis and by scatter plots.

## 8. Results

### 8.1 Influence of experiential concepts on products

Results for the survey done are shown in figure 2. The mean score of the four design factors for all 5 items evaluated by the students, n=50 subjects.



**Figure. 2** Mean scores of 5 selected products across the 4 experiential concepts

Overall the 2 products that scored highest were the Rolex watch and Mt Blanc pen. These 2 products were also significantly different compared to the other 3 products ( $p < 0.0001$ ). The Rolex watch scored the highest for 3 of the 4 experiential concept, except for the sociological experience category where Mont Blanc pen, scored highest ( $p < 0.0001$ ). Error bars represent 1 standard deviation from the mean score. Lines were joined for design factors to demonstrate trends between each product tested

- Rolex watch scored highest for all experiential concepts except for the Sociological experience (figure 2).
- Rolex watch and Mt Blanc pen both scored higher than the other 3 products.
- Hello Kitty savings bank scored lowest for 2 of the 4 experiential concepts (Physiological and Sociological) but quite high for Ideological experience category.
- Taksun calculator scored lowest for ideological and cultural experiential category ( $p < 0.001$ ).

## 9. Associations between the four experiential concepts

**Table 1:** Overall associations between experiential concepts, rho squared ( $r^2$ ) and p values, and correlation characteristic between experiential categories

Associations	$r^2$	p value	correlation
P and S	0.93	0.0001	positive linear
P and C	0.85	0.0001	positive linear
P and I	0.61	0.0001	positive linear
S and C	0.88	0.0001	positive linear
S and I	0.69	0.0001	positive linear
C and I	0.82	0.0001	positive linear

The Pearson Correlation coefficient or  $r^2$  between the overall data from all 4 experiential concepts ranged from 0.61 to 0.93 (Table1). All the 4 experiential concepts have a positive linear correlation, which is statistically significant ( $p < 0.0001$ , refer to Table 1). Therefore all the experiential concepts are related to each other in a way that provides a design aspect or perspective to the design product or object. In addition, all residual plots showed that the linearity and constant variance assumption is valid.

## 10. Discussions

How subjective experiential concepts of the Physiological, Sociological, Cultural and Ideological experiences influence objective sensorial elements in product design? What is it that makes one product more enjoyable or reflects a person's lifestyle better than another? Why do people find some experiences exciting and affirming whilst others are the opposite? How much do the physiological, sociological, cultural and ideological values and experiences influence our perceptions?

This study has shown that the subjective experiential concepts of the physiological (Pe), sociological (Se), cultural (Ce) and ideological (Ie) trends of each product do influence the quality of the user experience.

The outcome of this survey has rejected the null hypotheses and supported the proposal that when a product has taken into consideration the four experiential concepts of the physiological, sociological, cultural, ideological and manifested them in the form of appropriate formal product qualities as described by Vihma (1995) and Green and Jordan (2000) i.e. form, color, materials, graphics, sound and interaction, the product would score high in the experiential scale and was successful too.

The five products that were chosen for this study were based on their relative success or unsuccessfulness in the marketplace. The success and failure of consumer products as we all know is ultimately decided in the market place (Bonner & Potter 2002).

The Rolex watch and the Mont Blanc pen are very successful consumer products in Singapore (DP Information Network Ranking Services, 2000), whilst the Alessi 'Magic Bunny' toothpick holder has also done well in the marketplace as the agent, X-Tra Design Private Limited, Singapore, has only started the business two years ago.

All three products scored well and had statistically significant and different mean scores from the other 2 products, with the Rolex watch scoring highest for 3 of the 4 design factors.

## 11. Conclusions

This study was conducted to investigate experiential approaches and how these experiential concepts of the physiological, sociological, cultural and ideological experiences influence specific formal properties of products in industrial design. Results from this study have shown that these four experiential concepts do influence formal product properties. And in turn, the relationship between the four experiential concepts and the product properties influence the quality of the user's affective experiences with products. Correlation tests results also showed support for the questionnaire characteristics to be both independently discreet in describing each design item and yet related in a manner that describes the overall design aspect of the design product.

The results of the survey also showed that when a product has taken into consideration, the four experiential concepts and manifest them in appropriate formal product properties as described by Vihma (1995), Wenger (1998), Kuethe and Reinmoeller (1999), Jordan (1999) and Green et.al. (2000), the product scores high in the experiential scale. From the objective mean scores plotted against the four experiential concepts proposed, significant differences were found between each product which supports the hypothesis that a successful product will score well in all four experiential concepts.

Therefore, indications are that a well designed, holistically considered product would have taken into consideration critical contributing factors such as the physiological, sociological, cultural and ideological elements of people's affective experiences with products.

$$\text{Holistic Product (Hp)} = Pe + Se + Ce + Ie$$

If the four experiential concepts Physiological Experience ( $Pe$ ) + Social Experience ( $Se$ ) + Cultural Experience ( $Ce$ ) + Ideological Experience ( $Ie$ ) are well represented in a product, then the chances of success in that product will be high, as is seen in the test results of highly successful products from Rolex, Mont Blanc and Alessi. The 'Hello Kitty' savings bank scored high in the ideological and cultural experience because of the ideological iconic status of the cute Japanese cat's strong associative influences within a community of interest i.e. teenagers, but low in the other two experiential categories because of poor physiological and sociological experiences with the product.

This could also suggest that as designers, we can manipulate specific product experiences to imbue products with biases in terms of these experiential concepts. For example, if we had to make sure of a high ideological content in the products that we were designing.

Manipulation of these formal product properties with an understanding of people's affective experiences within a framework as I have proposed will not only serve to include the intrinsic richness in this area of people's subjective emotive experiences but be able to measure effectively these subjective experiential variables in ways that are useful to the area of product design.

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